

# An Incremental Pharmacy Informatics Model for Use in a Rural Hospital

Douglas A. Talbert PhD\*, Edward Roush BS\*, Luis Velazco BS\*, Casey White PharmD†

\*Dept. of Computer Science, Tennessee Technological University, Cookeville, TN

†Dept. of Pharmacy, Cookeville Regional Medical Center, Cookeville, TN

## Abstract

*We present an implementation model for pharmaceutical computerized decision support (CDS) that enables a hospital to incrementally target specific "high value" projects as needs are identified and support is secured. Our model, which we are currently implementing in a rural medical center, allows the hospital and its staff to quickly reap some benefits from CDS in spite of resource limitations.*

## Introduction

Limitations in financial, staff, and information technology resources in rural hospitals make the implementation of computerized decision support (CDS) tools difficult to justify.<sup>1</sup> In our case, resource limitations at Cookeville Regional Medical Center (CRMC), a 247-bed hospital in rural Tennessee, hindered the implementation an intravenous-to-oral (IV-to-PO) conversion protocol, in spite of the known benefits of such a tool.<sup>2</sup>

Prior experience with an incremental approach to implementing pharmacy informatics<sup>3</sup> indicated that, once embedded, a tool capable of electronically reviewing orders can support the addition of new decision-support functionality with little demand on resources. Whereas a need to be responsive to an evolving understand of needs motivated [3], a similar model enables a kind of bootstrap approach to CDS in which the savings achieved by the initial effort provide resources that can be used to justify and support the implementation of subsequent functionality. This ability to implement CDS in small increments as justified by a cost-benefit analysis is well suited to rural hospitals.

## Model Description

The basic model consists of four elements – (1) sources of patient-specific data, (2) a knowledgebase, (3) an order review tool, and (4) a reporting mechanism. While a relative small team can construct the initial knowledgebase, order review tool, and reporting mechanism, access to accurate and comprehensive patient data in an electronic format may be more difficult to accomplish. Additionally, since we are focused on resource-limited situations, new large-scale data acquisition efforts are unlikely. Thus, the content of existing data repositories will probably dictate which CDS functions are possible. One should also consider the cost-benefit tradeoffs associated with the possible CDS options.

Prior to the initiation of our project, CRMC determined the financial benefits of more effectively transitioning patients from IV antibiotics to PO antibiotics and developed a protocol for determining which patient are likely candidates for that transition. A manual review of all patients by a clinical pharmacist, however, was too time-consuming.

After a brief analysis, we determined that electronic access to most, but not all, of the patient-specific data required to make IV-to-PO recommendations was available, and since that data was adequate to produce a list small enough for the hospital's clinical pharmacist to manually review within a reasonable amount of time, we concluded that IV-to-PO conversion was an appropriate choice for our initial CDS effort.

## Model Implementation

An ability to evolve the functionality as new data sources and needs dictate changes drove many of our design decisions. A layered architecture consisting of a data layer, a data abstraction layer, and a presentation layer helps isolate changes as the IT environment evolves. Furthermore, we designed all the project-specific components (the knowledgebase, the order review tool, and the reporting mechanism) with extensibility in mind. For example, designing each piece of CDS functionality as a separate encapsulated unit reduces the likelihood that new functionality will introduce regression faults. Thus, we pay special attention to coupling and cohesion issues during the software design process to ensure appropriate encapsulation.

## Conclusions

We believe this adaptation of a proven incremental model can serve as a good model for CDS implementation in resource-limited situations such as rural hospitals.

## References

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